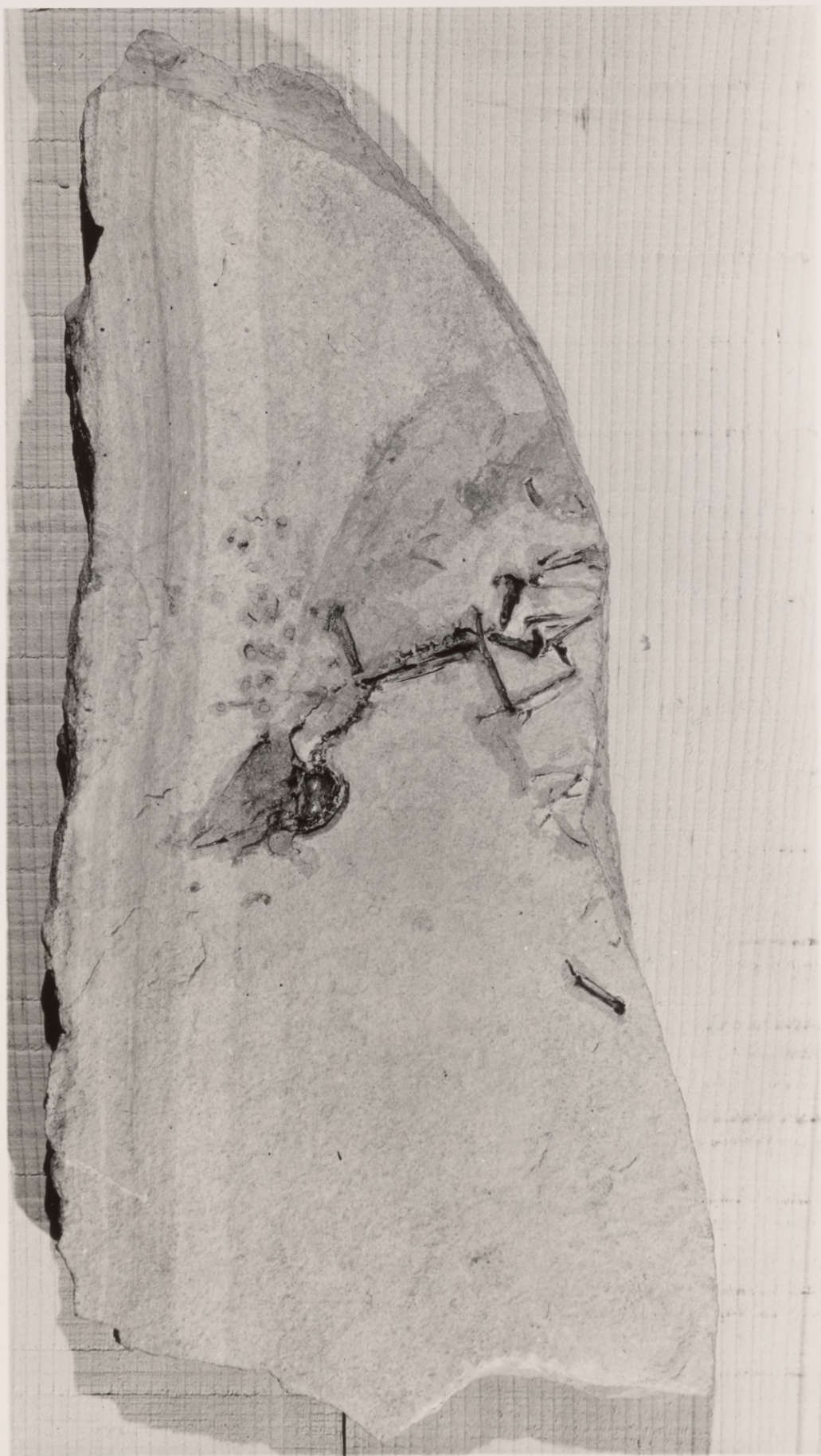




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Palaeositta turdinoctis type

Description of Sta. Maria bird

Sternum: - 27.4 from mid front of keel to post. tip.

9.6 ht from tip of keel to dorsal edge of manubrium at its connection with body of sternum

6.6 length of manubrium

2.1 ht of " (or width?)

6.7 ht of keel



Keel straight at front - and relatively low

Manubrium slender, sloping upward with no ventral protuberance

Five costal attachments

The sternum is represented only on the larger slab. It is an impression of the left side of the keel ^{manubrium} and the ^{curved} dorsal edge of the costal process showing indentations (instead of processes) for the ribs. Imprints of ^{base of} ribs present,

Upper mandible

Practically straight ventral border.

Large, regularly oval nasal opening approx. 14.6×3.9 mm. in size, set 10.4 mm. from anterior tip.

3.1
6.2

Passeriform characters of fossil bird

- ① Long slender manubrium (extends beyond front of keel)
on woodpeckers front of keel protrudes forward + manubrium is part of it.
- ② M I of foot not joined to tarsometatarsus as in woodpecker
- ③ Phalanx connects M_3^2 to M_4^3 of the carpometacarpus
(true also of woodpeckers)
- ④ M_4 extends below M_3 considerably (also true of woodpeckers)
carpometacarpus
- ⑤ Symphysis of lower mandible equal in length to area of upper mandible anterior to nares (not true of flicker)
- ⑥ Ungual of digit 2 shorter than ungual of digit 1
(reverse is true in flicker)

Turdid-like in shape described for Turdidæ (Cuv.) as follows: ^{p. 247}

Bill not stout & angulated

? Bill not flat with gape reaching under eyes

Bill slender, straight (a tiny bit curved ~~for Turdidæ~~)

Ventril oral

No

Tarsus usually long & slender
never decidedly shorter than middle toe & claw
toes longer - (about same length as joint)
(equal to middle toe often - also true to minus
first seems to be equal)

Famililes of Passeriforms
with distinguishing characters pertinent to the fossil bird

Tyrannidae (Flycatchers)

Cotingidae

Trochilidae (Hummingbirds) -- bill subulate

Micropodidae (swifts) -- bill small, very short (not in passeriformes now)

NO Chamaeidae -- wings shorter than tail; bill much shorter than head, deep at base, straight, stout, compressed-conical, no notch.
convex culmen, nearly straight commissure and gonys.

★ Turdidae -- wing over 3 inches. Tarsus usually long and slender, never decidedly shorter than middle toe and claw, often decidedly longer.

Cinclidae -- wing over 3 inches. *Bill shorter than head, slender compressed*

Sylviidae (Kinglets) -- wing not over 3 inches; slender bill, more or less notched or even hooked at tip.

Laniidae -- bill strongly epignathous, toothed and notched
body

Corvidae -- bill paragnathous, /over 7 inches long

Sittidae -- bird not 7 inches long, bill nearly equal to head in length
Tarsus shorter than mid toe and claw. large curved, compressed
claws. 1st toe and claw about equal to 3rd.

Paridae (tits) -- bill scarcely or not $\frac{1}{2}$ equals head in length; bird less than 7 inches long; tarsus longer than mid toe/
bill compressed, stout, straight, unnotched,

Sturnidae -- length more than $8\frac{1}{2}$ inches

Ampelidae -- length 7-8 inches

Vireonidae -- length $4\frac{3}{4}$ - $6\frac{1}{4}$ inches, bill distinctly hooked

Certhiidae -- length $4\frac{1}{2}$ - 5 inches; bill slender, curved; tarsus shorter than 3rd toe and claw. 1st toe shorter than its claw; claws much curved and sharp

Sylviidae -- length under 6 inches

Troglodytidae

Mimminidae -- tarsus equal to mid toe and claw

Alaudidae -- hind claw straight

Tanagridae -- bill paragnathous, tomia of up. mand toothed or lobed near the middle

Vireonidae -- bill epignathous, notched and hooked at tip; length $5\frac{1}{4}$ - $6\frac{1}{4}$ inches

Hirundinidae -- bill fissirostral, triangular-depressed, about as wide at base as long, gape twice as long as culmen, reaching about opposite eyes. Tarsus not longer than outer toe and claw.

Motacillidae (wagtails and pipits) -- bill dentirostral or tenuirostral hind claw usually little curved, nearly twice as long as middle claw

Mniotiltidae (warblers) -- bill fisirostral or tenuirostral. Hind claw well curved, not nearly twice as long as middle claw.

Coerebidae -- same as Mniotiltidae

ND Icteridae -- Bill conirostral; usually thick, stout and with evident angulation of the commissure.

ND Fringillidae -- same as Icteridae but bill metagahous

405511 Compared with:

Turdus migratorius

? Beak appears a bit longer and sturdier & straighter
some jaw longer & sturdier - post. projection more attenuated
a head longer than Californiacapus "a head" shorter

larger than
H. ustulata
than H. ust.

Sternum smaller, straighter fore margin of keel
line from manubrium to keel not

pelvis more constructed antly more definite
"pockets" formed by flared ilia posterior

shorter
of Hylocichla
ustulata
but tarsus
shorter than
longer than
about same
length

Tibiotarsus more slender $\frac{1}{2}$ inch shorter

Tarsometatarsus " " " $\frac{1}{2}$ " " " (tarsus rel. very short)

Humerus longer but appears like more slender
but as longer or longer

Ulna more slender "a head" shorter

Radius - approx same size

Coracoid - slightly shorter but procoracoid short as in Turdus

Myiarchus cinerascens

Beak narrower & more v shaped (that is higher)
also longer. Same for lower jaw

Coracoid lacks attenuated procoracoid of Myiarchus
and is longer & rel. more slender

Femur longer & sturdier

Tibiotarsus "a head" longer

Tarsometatarsus "a head" shorter, Toe bones longer

Californiacapus "a head" longer

Humerus more flare proximally, longer

Ulna & radius same length as in Myiarchus

Radius longer

Sternum: manubrium more slender lacking "bump"
anterior border of keel straight not S as in Myiarchus

Pelvis broader across, more unpaired "pockets" narrower
anteriorly.

No Phainopepla - short beaks (short symple,)
humerus back undercut
short, high mandible, fair deep notch
widely sep'd ilia cut by

No? Cinclus - ✓ long beaks
X humeral head undercut + pectoral crest small
✓ broad xiphisternus process, short notch
X prominence on mandible
✓ carina low
X carina curved out
? bend in mandible mid way
X short femur, long tarsus
X tarsus much longer than D3
X nasal opening set back almost to subnasal

Thraupis - X short beaks
X ~~moderate~~ notch 39%
X slender xiphii
✓ long slender mandib.
✓ low carina
X undercut humeral head

Icteria - shortish beaks (longer than Thraupis tho)
shallow notch moderate 39%
squarish mandible but long
low carina
long tarsus

Microscelis - ✓ long beaks -
X ~~short~~ notch
✓ long tarsus not to close to subnasal
X long notch
X slender xiphii
✓ long mandib
✓ short tarsus - than femur
? tarsus may be shorter than 3rd toe w/ claw

Vireonidae -- Vireos

Compsothlypidae -- Wood Warblers, Yellow-throats, Chat, Redstart

Icteridae -- Blackbirds, meadowlark, orioles

Thick, stout beak, very angular commissure

Thraupidae -- Tanagers

Tarsus longer than femur

Fringillidae -- Finches, towhees, sparrows

Thick, stout beak, very angular commissure

Family Compsothlypidae

Thraupidae

Bombycillidae

Sturnidae

~~Alaudidae~~

Alaudidae

Suborder Clamatores

Tyrannidae

Cotingidae

Fossil
^ Compared with:

Sturnella neglecta

Upper beak higher & apparently straighter
Lower mandible about same length or a bit shorter
and has ^{the same} long process at posterior end of anterior
surface (perhaps not quite as long as *Sturnella's*)
Sternum smaller. Manubrium lacking prominence near tip
ant. border of keel straighter

Pelvis broader, and maybe shorter anteriorly
Coracoid $-\frac{1}{4}$ inch shorter, Small procoracoid similar
Humerus $\frac{3}{8}$ " shorter

Tarsus - much more slender & only $\frac{2}{3}$ the length of

Tibia " " " ... less than $\frac{2}{3}$ " "

Femur " " " " $\frac{1}{4}$ " shorter

Ulna more slender & "a head" shorter

Oreoscoptes montanus

manipulation
10.1 mm x 3.9 mm
8.0 x 3.2 mm

Upper beak heavier but about same build - straighter perhaps (no sign of even the slight curve of *Oreoscoptes*)

Lower jaw longer but relative slenderness & straightness similar

Coracoid slightly longer - procoracoid same small size

Humerus longer

Carpometacarpus longer

Ulna & radius $\frac{1}{2}$ " longer

Tibiotarsus - $\frac{1}{4}$ " shorter

Tarsometatarsus $\frac{1}{2}$ " shorter

Femur "a head" longer

Pelvis wider & more full of "pockets"

Sternum - manubrium lacks ~~the~~ ventral protuberance

Keel straighter forked as in *Oreoscoptes*

line up from ^{top} manubrium in fossil - middle or bottom in bird
& goes nearer to vent. edge of keel in fossil

The humerus does not bear the deep excavation beneath the head which characterizes ^{makes the osseous part of the} ~~the~~ Thrushes, ^B Tanagers, warblers and icterids, on the other hand the ~~shaft adjacent to the median crest is slightly~~ depressed and the apex of the shaft angular unlike the ^{situation} ~~of the~~ Glycimeris & Cotingas. The ~~shaft is not~~ ^{is not unlike that in the jays particularly} ~~is not unlike that in the jays particularly~~ in the close proximity of the median crest & the apex of the shaft.

~~The~~ Humerus: apex of shaft at prox. end angular with adjacent ^{intermedial} face of shaft depressed behind the median crest, ^{thus differs from the humerus of the Thrushes} ~~shaft~~ ^{deeply} excavated ^{below} under the head as in the Thrushes, Tanagers & icterids. Median crest closer to apex of shaft than in most song birds. Chas. somewhat similar to jays, but crest & apex closer Br. prox 9.3

~~Hylaeus~~, in order of excav. below head

- 1522 Tyrannus - no excav. no twist & head, convex shaft
1612 Bombycilla " " obvious twist, ^{rounded} convex shaft
✓ 285 Aphelocoma " " slight twist, angular, flat shaft
50491 Chamaea tery " " " " " "
✓ 68356 Vireo little more " " " " " "
~~Set~~
X 1718 Otocoris " " " " " "
✓ 1542 Salpinctes " " " " " "
X 73108 Certhia " " " " " "
X 1595 Onychophanes " " " " " "
83630 Cinclus defunctus ^{well circumscribed} " " " convex shaft
4270 Basileophanes ^{not circumscribed} quite excav. " " " angular flat shaft
58445 Piranga well circumscribed deep excav. " " " convex " "
927 Turdus " " " " " " " "
1422 Icterus " " " " " " " "
94130 Thrupis " " " " " " " "
88531 Icteria " " " " " " " "
74743 Sitta deep " not circumscribed " " " flat " "
1527 Sturnella " " " well ^{fringed} " " " " "
" " " " " " " " " " " "
" " " " " " " " " " " "
no excav. tendency to circumscribed area angular
long, well extended ectopituitary process - Salpinctes, Certhia, Basileophanes, Vireo,
Thraupis, Trogodytes, Certhia, Pandion
Hylaeus but also well extended - Sitta
Most like Tyrannus - not much extent = Otocoris

Similar to Microscelis (Bulbul)

Humerus, ^{head} ~~slightly~~ ^{stet} ~~toward internal crest~~ ^{bent anomalously on internal side}

no deep undercut of head.

^{selfoid} pectoral crest slightly longer than internal crest and in anterior view dips toward shaft at midpoint

Tarsus short

Scapula rel. Broad blade

Length of toes

Longest = middle

next = 4th

my = 2nd

shortest = 1st } about the same

Myal 70% of Ph 1 dis. 1

Diff -

Stemur manubrium long (or) but straight
not curved as in T. uideides

Carina very straight ant. border (straight like H. uideides)

Notch deep & borders slender

no curved line near tip of carina

Bill ~~with~~ ~~more~~ ~~down~~ curved

nares with thin frags of bone laterally (might have been destroyed but would think they would ^{show} mark & not a perfect oval as in fossil)

Shaker femur

Proportions

Beak; wing and body elements - Turdidae

Short legs

Absence of fossa for tibiae in humerus -

Pycnonotidae, Certhidae, Bombycillidae

Bombycillidae

Bombycilla

Hummer's short deltoid

Absence of undercut head

Neither genus has same flaring of deltoid as fossil

Phainopepla

long deltoid

← same

Hummer

Shaper manubrium

high carina

long notch but continued

same

low carina

slinter broader notch

Beak short

Olandidae

OK Hum long manubrium but

NO Deep notch & slender border

NO Deep carina

Tarsus long

Scap slender

Turdidae

Hummer's deep undercut head

scap slender

Hummer's deep notches & slender border

Hummer's like turdidae

Cinclus of fossil

Stemur

✓ OK Short notches & broad borders

NO Manubria too short & deep

✓ OK Carina shallow (OK) & with mark near tip OK
but more curved anterior

NO Tarsus long

Fair Humerus depressed near head but not deeply cut

NO Not bent as much anteriorly

NO Deltoid crest shorter & not at incised at midpt.

Beak more slender & straighter & nails rel. longer

Comidas

Humerus lacks undercut

Bends anteriorly but less than fossil

~~Deltoid~~ crest less medially incised

Stemur

Manubria short & deep

✓ notches short but borders more slender

✓ Line on carina OK

Carina more curved

Tarsus long

Scap fairly broad

Suborder Tyranni

Superfamily Tyrannidae

Available: Pittidae - Pitta

Tyrannidae - Tyrannus

Cotingidae - Ruficollis

Characters in common:

True also to limited extent

of Phainopepla
Suborder Oscines
Bombipallidus
Pitogonatus

Manubrium of sternum deep

Xiphisternal process (if present) short

Symphysis between M2 and M3 of carpometacarpus

~~pointed at distal edge~~ ^{marked} heavy, pointed
protrusion at distal edge which gives

the distal margin a pointed appearance

in contact to the stylus, blocky base
of the thrust. Outer margin of M3 ~~marked~~

shaft on
lateral side, proximal end of humerus

convex (not undercut below head)

→ see Pitta? Center of sacrum ant. by a long narrow ridge Ant. iliac
Oscines Suborder Procoracoid more or less than in oscines

Superfamily Bombycillidae & Acanthidae

Family Bombycillidae (includes Phainopepla;

Manubrium short tho 2 flange processes may
continue on longer (Phainopepla short but
not like Tyrannidae)

Humerus convex shaft anteriorly, near prox end

No deep undercut under head but slight
depression & distal shaft angular at apex

Ant. part of sacrum (centrally) ridge but

back of it is broader & more bulbous

Ant. dia short

Lower & tarsus about equal length (Phainopepla)
"longer Man" in Bombycilla) Humerus very slight
longer Man

226 17.80
678
1020

167 6.30
601
299.02

242 1850
1752
980
267 1330
1335

226 Tyrannus
25 17.8
193 6.3
167 Phainopepla

38 160
152
50

10 34

Phainopepla

Wrens, have very low carina
Titmouse has hump on mandible & deep notch

Nuthatches, chickadees & Titmice & creepers

Passer domesticus 19.0 tars, 18.5 femur
(rather heavy mandible for size of tarsus)

Bird of Paradise

Pelvis long & thin posteriorly, about equal by its ant'ly axis. Iliac foss. widely spread ant'ly

Stem has 6 costal ridges

curved ridge about as in fossil but starts near top of mandible

(at base in fossil). No tarsi available

Cock of the Rock - *Rupicola corona*

Stem with incomplete fenestra (no pen posterior)
mandible with hump
beak very curved
5 costal ridges

Femur ~~only~~ slightly longer than tarsi

Ptiler cyanocephala

Tarsus longer than femur

Stem 5 costal ridges

broadly obtuse curved ridge

humped mandible

slender xiphisternal process

Low mandibles - long beak symphysis

Oval nares

Carpometatarsus - short 2-3 distal synphysis

coming to a sharp pt. not far below

M 2,

Pelvis - no marked ridge in center of post. centrum

not very anteroposterior post'ly

& ant'ly narrow, ilia separated

Humble erythrogastrus

feem capitate rarer

Broad pelvis (short & broad ant leg)

Large carpus (larger than femur & stibia)

M 3 symple long & thick.

Canis well forward, ^{slab} hump on
manubrium

not distinct in skin

Tracheal tubes & Saccularis

Femur long & thin

Long narrow manub.

Long straight carina. ^{or straight} obtuse edge

Long symple M 3

Pelvis br. in back. Navicular foot long

separate dist ant leg

~~End~~

Reviewing the characters described in the preceding section, ~~the most characteristic are as follows:~~

Those which appear to have phylogenetic significance ^{at a possible family level} are as follows:

Sternum: Long slender manubrium; short sternal notch; broad posterior lateral processes

✓ Cinclidae
✓ Corvidae
✓ Pycnonotidae

Scapula: Broad blade near articular end

✓ Pycnonotidae
✓ Corvidae

Humerus: Absence of undercut below head; head bent acronally so that proximal end of pectoral crest is high with respect to head; pectoral crest, viewed acronally, depressed in middle, flaring slightly proximally & distally.

✓ Pycnonotidae
✓ Bombycillidae
✓ Corvidae

Others, ~~misses~~ such as the ^{notable} Thrush-like bill and the relatively short legs, ~~are~~ while ¹ characteristics of Palaeositta turdinatoris, are considered to be of no more than generic value, possibly only specific.

5.8
5.8
77
19.3
my. 22.3
22.3

Claws of fossil

Tarsus approximately same length as middle toe & claw

~~on very slight of claws~~

Bill ^{slightly} longer than head ^{sittidae}. Slender. Shorter than head?
23.7 1 22.7

1st toe & claw 15.5 mm. 3rd toe (rest claw) 22.3 mm.

Claw of 1st toe almost twice the length of claw of 2nd toe (5.5 & 3.0)

Tarsus shorter than femur (~~see Motacillidae~~)

Thamnophis only 3 mm longer tarsus & {Thamnophis} 9 mm
{Pinnace}

Wing length? ——— $4\frac{1}{2}$ - $4\frac{1}{4}$ "

Upper & lower mandibles same length

16.3
15.3
31.0
19
81.6

Wing length - fossil $4\frac{1}{4}$ or $4\frac{3}{8}$ " (bill .875 ap. (curves) tarsus $\frac{7}{8}$ "
(108 mm. or 108.5 mm.)

Merulamigastona 5- $5\frac{1}{2}$ " bill .8" tarsus $1\frac{1}{4}$ "

" propinqua 5.6"

" confinis wing 5.1, tarsus 1.2

Geopichla naevia wing 5.0 tarsus $1\frac{1}{4}$, bill .8

Turdus iliaca $4\frac{1}{2}$ " bill $\frac{3}{4}$ " tarsus 1.15"

Pyrocephalus naevius 5" wing 8" bill, tarsus $\frac{1}{4}$ "

Hylocichla ustulata wing 4- $4\frac{1}{4}$, bill $\frac{3}{4}$, tarsus $1\frac{1}{2}$

" fuscescens 4- $4\frac{1}{4}$ " .6 " 1.2
2 3, 9 " " 1.12

Sialia mexicana wing $3\frac{3}{4}$ -4" tarsus 0.7 bill .45

Circus mexicanus wing $3\frac{1}{2}$ -4, bill .6" tarsus 1.12"
mid toe & claw shorter than tarsus

Oreoscoptes montanus wing 4" tarsus 1.12, bill $\frac{3}{4}$ "

Mimus polyglottos wing $4\frac{1}{2}$ -5, bill $\frac{3}{4}$ " tarsus $1\frac{1}{4}$

Beak of fossil is paragnathous - up & lower of approximately equal length

Tertiary Passerines

Alandidae

- ✓ *Alanda gypsorum*
 - ✓ *Alanda major*
-) Pliocene of Italy

Palaeospizidae

- ✓ *Palaeospiza bella* - ^{Oligo or Mio?} ~~Pliocene~~, Colo.

Hiirundinidae

- Plenty only *H. fossilis*

Corvidae

- long legs
like crows
- ✓ *Microrax larteti* - Miocene Europe
 - ✓ *Corvus praicorax* } Pliocene "
 - ✓ " *pluvius* }
 - ✓ " *hungaricus* }
- 2 sps. Plenty + 1 Oregon, 1 P. Bed
1 " " France
2 " " Holocene N. Z.

Pandae

- ✓ *Palaeognathus cuvieri* - Eocene France

Sittidae

- ✓ *Sitta senogalliensis* - Pliocene Italy

Turdidae

- 1 Plenty *T. brevis* of Sardinia

Motacillidae

- ✓ *Motacilla lumata* - Oligo, France
- ✓ *Motacilla major* " "
- Subfossil Rodriguez
- ✓ *Anthus bosniacus* Pliocene, Eng?

Saniidae

- ✓ Lantus micacurus Oligo, France

Laniif?

- ✓ Laniillardia longirostris Es, France
✓ " parisiensis Es, "
✓ " muriei " "

Deluidae

~~Pleuro 3 spp. U.S.~~
~~Cyclorampulus molothroide~~

Tringillidae

- ✓ ~~Palestrutrus~~ ^{Migrid} hatcheri - ~~Mid~~, Kansas
✓ ~~Junco~~ sp. - ~~sp. Plid~~, Arizona
✓ Tringilla ~~radoboyensis~~ ^{Mid}, Europe
~~Pleuro hochlandica~~
2 sp. ? ~~Mid~~, Europe
1 sp. ~~Plid~~ Arizona
? ~~Eor~~, ^{oligo} 1 sp. France

16 sp. Europe
3 U.S.

Comparisons with Known Fossil Forms

Sauritbardia longirostris Milne Edwards

(1871 pp 374-377, pl 161, fig. 1)

TRANSLATION

Upper Eocene, Montmartre

"The bones of the forearm are a little longer than those of the upper arm; however, they do not acquire the dimensions of those of the Guepiens and for the most part the Syndactyles the metacarpus is also shorter than that of the latter birds. Finally the nasal opening, instead of being small & oval, seems to have been much more elongated, which undoubtedly resembles ~~the~~ the Aedornines, & especially Procerops, (Sunbird?)

Length of head from occiput to tip of beak	43	
" " humerus	23	
" " forearm	28	
" " metacarpus	14	28) 230
" " 1st phalanx	7	22 4
" " femur	17	60
" " tibia	28	
" " tarsus	16	

Milne Edwards 396

By the thickness of the foot, by the elongation of the beak & the groove in the frontal part of the cranium the bird — ~~seems~~ seems to approach certain of the Syndactyles & particularly the Guepiens; but it is distinguished by the position of the digits which seems to indicate a type Passerine. They are well separated from each other, well developed — the big toe has large size which is ordinarily not observed in the Guepiens.

The bones of the forearm — etc. see 1st 94.

It cannot however be put in the genus Promerops
whose feet are longer, wings shorter & beak more thin,
it must form a small division ^{capitulum} near it.

Comparisons
~~xAmongst the species compared~~

As would be anticipated, this Miocene bird cannot be satisfactorily compared with any one living species. Characters were checked, also, with Palaeospiza bella of the Miocene of Colorado, with the following results:

Paleospiza bella.
Bones of wing strong and heavy
Ulna shorter than humerus
Phalanx 2 of alar digit 2 nearly half the length of the carpo-metacarpus
Hind toe shorter than digits 2, 3 and 4
of humerus
Pectoral crest/short, distally extremity on line with distal limit of subtrochanteric fossa

as in *Bombus*

California Miocene species
Bones of wing long and slender
Ulna longer than humerus
Phalanx 2 of alar digit 2 less than $1/3$ the length of the carpo-metacarpus
Hind toe longer than digits 2 and 4, but shorter than digit 3.
of humerus
Pectoral crest/~~of normal length,~~ extending distally beyond the limit of the subtrochanteric fossa.

Among European Tertiary passerines, only three species suggest possible relationship to Mimiturdus. These are Laurillardia longirostris Milne Edwards, Laurillardia parisiensis Flot and Laurillardia munieri Flot, all from the Upper Eocene of France.

L. longirostris -- characters		L. parisiensis	<i>Paleospiza</i>	L. munieri	Mimiturdus
Length of skull	-- 43	37		34	45
Length beak?	28	18		17	23
" forearm	28	27	22	20	33
" humerus	23	22	23.4	16	27
" carpus	14		12.6	14	17
" 1st phal.	7				9
" femur	17	16	18	12	24.5
" tibia	28	27	27	23	35
" tarsus	16	16	17.5	12	23
Ratio tar-hum	70%	72%	74	75	85
" fem.-tib	60	59	66	52	70
" fem.-tar	94	100	97	100	93
" tar.-tib	57	59	64	52	65
" hum.-ulna	82	81	106	80	81

Fossil Passerine Comparisons

Species	Length of skull	Length of beak	Ratio of beak to skull	Length of sternum	Ratio of length of notch to length of sternum	Length of humerus	Length of ulna	Length of metacarpus	Length of phalanx 1 of hand	Ratio of humerus to ulna	Length of femur	Length of tibia	Length of tarsometatarsus	R. femur - Tib. Ratio	R. humerus - Tib. Ratio	R. tarsometatarsus - Tib. Ratio	Length of wing bones	Ratio of wing bones					
Mimodendro	48.3	23.7	52%	25.5	8.7	34%	27	33.1	17.0	9.0	81%	24.5	35	23	70	71	65	90.93	85	91.0	82.5	90%	
Turdus mig.	47	21.4	45%	27.5	11.7	42%	30.3	37	20.3	10.3	81	29.4	48.7	34.9	60	61	71	91	118	115	102.5	113.0	110%
Ixoreus naevius	46.7	22.3	47%	28.8	11.4	39%	28.3	34.7	19.4	10.1	81	27.9	43.8	31.7	60	62	69	98	113	112	92.5	103.4	113%
Tyrannus vert.	40.4	19.6	48%	22.7	7.2	31%	27.3	39.7	20.0	8.3	68	19.7	29.6	18.0	66	92	60	77	91	65	103.6	67.3	65%
Sialia mex.	35.3	14.2	40%	18.3	7.4	40%	20.4	27.9	15.0	8.5	73	17.9	30.5	21.1	58	67	69	87	117	103	75.2	69.5	92%
Aphelocoma	55.2	26.0	47	24.0	8.1	33%	30.7	36.2	17.0	7.9	84%	32.1	52.6	38.8	61	58	73	104	120	126	92.1	123.5	127%
Cinclus	44.8	21.2	47%	24.7	9.0	36%	23.4	27.3	12.1	8.5	86%	21.4	40.6	30.4	52	57	74	91	142	130	80.7	92.8	115%
Phainopepla	31.0	12.7	41%	17.0	7.1	41	21.7	27.2	13.1	6.4	80%	17.8	—	17.8	—	—	—	—	—	—	—	—	—
Thryothorus	34.8	15.1	43%	21.4	8.4	39%	22.0	27.6	13.6	7.0	80	19.4	30.0	19.8	63	73	66	88	102	90	74.1	69.2	93
Bombuscula	32.7	13.2	40%	20.3	8.9	43%	19.6	24.2	13.7	7.9	81%	18.6	27.8	15.5	61	70	55	94	83	79	69.6	61.9	88
Otocoris	29.3	12.0	40	—	—	—	22.4	25.9	13.7	7.9	86	17.8	28.7	21.1	62	78	73	79	118	94	73.9	67.6	91
Myiarchus cinerascens	36.7	15.7	42%	—	18.4	—	19.7	25.0	13.0	—	—	20.0	36.8	28.0	54	53	76	101	140	142	—	84.8	—
Agrospiza	38.3	16.0	41%	22.2	9.8	42%	24.1	28.7	16.3	9.3	84	23.5	40.1	26.1	58	60	65	91	111	108	83.2	89.7	107.8%
Sturnus vulgaris	50.8	25.4	50%	27.3	12.8	46%	28.5	34.4	20.3	11.1	82	26.4	44.5	29.4	59	64	66	92	111	103	99.9	100.3	100%
Harporhynchus	43	22	51%	28.2	10.7	39%	24	30	22.0	11.0	80%	22	35	21	62	68	60	91	95	87	80.0	78.0	97%
Laurelaria	43	22	51%	—	—	—	23	28	14	7	82%	17	28	16	60	82	57	74	94	70	75	61	81%
L. parvirostris	37	18	48%	—	—	—	22	27	—	—	81%	16	27	16	59	81	59	100	72	—	59	—	—
L. munieri	34	17	50%	—	—	—	16	20	14	7	80%	12	23	12	52	70	52	74	100	75	70	47	67
Pallopterus	—	—	—	—	—	—	23.4	22.0	12.6	24.5	106%	18.1	27	17.5	66	86	64	74	97	74	69.9	62.5	77%
Oncophanes	42.7	18.1	42%	20.0	7.5	36%	23.3	28.0	15.2	7.7	82	22.7	40.7	30.6	55	57	75	98	134	131	78.5	94.0	119%
Sateria	—	—	—	16.1	6.3	39%	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bismaricus	37.2	18.4	—	13.7	5.9	43%	20.8	26.6	10.7	6.5	78%	15.2	21.9	13.3	69	95	60	73	87	63	67.9	50.4	74%
Muscicapula	35.1	16.3	—	15.0	6.7	44	17.6	23.5	9.8	5.5	74%	16.5	24.3	17.6	67	72	72	83	106	100	59.9	58.4	97%
Tilseon. vulgaris	—	—	—	—	—	—	17.2	21.2	—	—	—	14.4	22.8	16.6	—	—	—	—	—	—	—	—	—
Toxostoma	—	—	—	24.0	9.2	38%	27.2	28.9	14.8	—	—	31.1	51.4	37.0	—	—	—	—	—	—	—	—	—
Myiophobus	43.2	19.7	45%	21.9	10.3	47%	26.0	32.8	12.0	45%	—	24.4	42.0	31.7	—	—	—	—	—	—	—	—	—
Myiophobus	44	22	50%	28	—	—	24	32	—	—	—	21	31	19	67	75	87	90	79	81	71	87%	—
Microcelis	49.1	26.9	54%	22.7	11.3	49%	27.0	34.0	15.2	8.7	74%	23.8	34.5	21.0	69	61	88	88	78	89.2	79.3	88.9	—

Microcelis madagascariensis = Madagascar Bulbul

Measurements of fossil passerines
in millimeters

155
180

	a	c	e	d	e	f	g	h	i	j	k	l	m	n						
	length skull	length notch	length nares d lt nares	length length supraorbital	length skull	length skull to base edge mandible	length pelvis	length crown	length humeral	length radius radius	length carpus to end of M2	length femur	length tibia	length tarsus	ij	ki	lm	nl	nm	lg
Vireo solitarius cassinii MVZ 68356	30.5	12.6	5.6 2.3		16.1	6.3	9.5	14.2	15.5	17.7	—	14.3	24.5	18.5	88.8%		58.3	129%	75.5	150%
								wing length				leg length								
Vireo gilvus swainsoni 87 629	29.2	12.3	—	4.6	14.5	5.5	8.7	14.6	15.5	18.0	9.7	14.1	25.2	18.0	ulna 19.8	P102 5.4				
										43.2			57.3							
Phylloscopus borealis (clarkei) 126833 ♂	27.3	11.4	4.3 2.0	5.0	12.4	5.4	8.1	12.7	12.5	14.6	8.1	13.0	23.2	18.7						
										45.2			54.9							
Chlorospingus ophthalmicus ♀ Chiriqui 121482	30.1	12.2	4.2 2.9	4.6	13.2	5.3	10.3	14.8	16.1	17.3	—	6.5	28.7	22.0						
Phainopepla n. leipida ♀ 50491	31.0	12.7	5.1 3.4	4.5	21.0	7.8	13.6	18.4	21.7	24.4	13.1	17.5	22.5	17.8	ulna 27.2	Ph2dj2 6.4	Ph2dj2 4.5			21.7 27.2 13.1 6.4 4.5 72.9
										59.2			57.8							
Orearia v. longicauda 88531 ♂	34.7	16.5	6.8 3.7	8.2	17.5	6.9 35.90	12.7	17.0	19.7	19.5	11.4	20.5	35.3	26.4	22.2	6.3	3.7			
										50.6			82.2							
Phainopepla leipida ♂ Cana 9430	34.8	15.1	5.0 3.0	6.0	25.1	8.3	13.7	20.2	22.0	24.8	13.6	19.4	30.0	27.6	27.6	7.0	3.9			22.6 27.6 13.6 7.0 3.9 74.1
										60.4			69.1							
Piranga ludovicianae ♀ 58445	35.4	16.1	4.5 3.0	8.2	25.0	8.5	12.5	19.8	21.2	23.8	14.0	18.6	29.7	19.5						
										59.0			67.8							
Sitta carolinensis aculeata ♂ 74743	35.5	17.3	5.8 2.3	7.3	17.5	6.4	9.0	15.0	17.7	20.9	12.0	14.8	23.5	18.0	51.2 MI 10.5 pl. 1	22.4	6.4	3.3		10.3 11.3 without claw
										50.6			56.3							
Micropodops amantiss					22.7	10.2 45.0%														
						length manus ratio length to lt														

10.5
11.3
15.3
17.3
18.3

[illegible]

Body, wing & tarsal lengths on possession birds.

Ratio of wing size + leg size to sternal length

wing leg

Tossie 303% 275%

Bombus 318 285'

Phainopepla 350 275'

Otocoris 331 280

Sialia 389 321

Trogon 277 311

Melospiza 330 443

Zitta 355' 321

Thraupis 291 275'

Measurements of Passerinus ^{11.1}sheltoni ⁴⁸
83 89

	length mide	notch	length narrow	length stump	length stump to dorsal margin	length pelvis	length cora	length humerus	length radius	length carpal	length femur	length tibia	length tarsus						
<i>Regulus</i> <i>c. cinereus</i> 52018	25.4	11.4?	5.3 2.3	4.2	11.7	5.7	—	11.3	—	4.2	7.8	11.0	23.4	19.1	3.1 MI 6.2 PI				
<i>Motacilla</i> <i>flavescens</i> 126840	32.4	14.6	5.3 2.3	6.6	19.2	8.0	12.7?	16.3	18.0	21.2	11.9	16.8	32.6	25.6					
<i>Alcedo</i>									51.1				75.0						
<i>Ceryle</i> <i>spumosa</i> <i>rubescens</i> 504954 Mex	32.5	14.1	5.1 2.78	6.3	18.7	8.2	12.4	6.1	18.9	21.7	12.3	16.8	30.0	22.3					
<i>Acrocephalus</i> <i>arundinaceus</i> 1240389 Japan	42.7	22.0	7.8 3.8	10.8	16.7	7.0	10.5	18.7	19.0	20.7	13.0	22.0	—	27.6	5.0 16.0 PI				
<i>Sialia</i> <i>occidentalis</i> 152	33.6	14.5	5.9 3.1	5.0	21.5	18.7	13.3	18.2	19.9	25.1	14.8	16.9	30.5	24.0	27.9 7.3	8.6 P102	3.5 P202		
<i>Melospiza</i> <i>melodia</i>									15.1	14.4	8.7	16.8	26.7	19.4	17.9 16.4	8.6 P102	3.5 P202		
<i>Pipilo</i> <i>fuscus</i>					24.0				24.6	22.7	13.5	24.4	38.2	26.7	26.3	6.4	2.8		
<i>Icterus</i> <i>naevius</i> 1422	46.2	22.3	8.2 2.3	9.3	4.3				26.6	28.7	12.8	27.1	44.7	30.6	32.4	9.5	?		
1316	47.0	21.4	8.0 3.5	9.7	33.8	13.0	20.1	25.2	28.3	30.3	19.4	27.9	45.8	31.7	34.7	10.1	4.3		
<i>Oreoscoptes</i> <i>gambelii</i>	43.3	19.1	8.2 3.8	6.3	23.7	9.4							105.4					wing	96.8

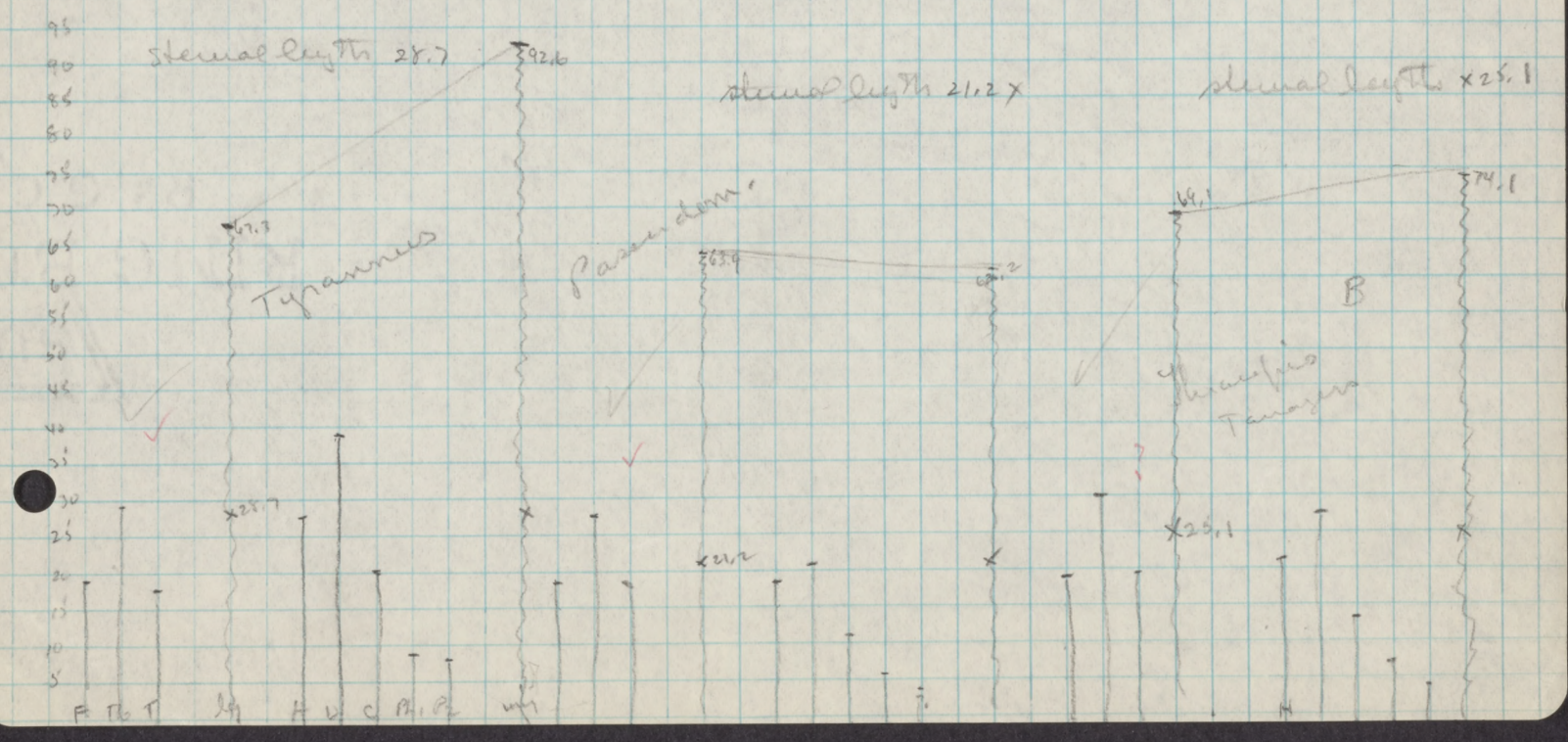
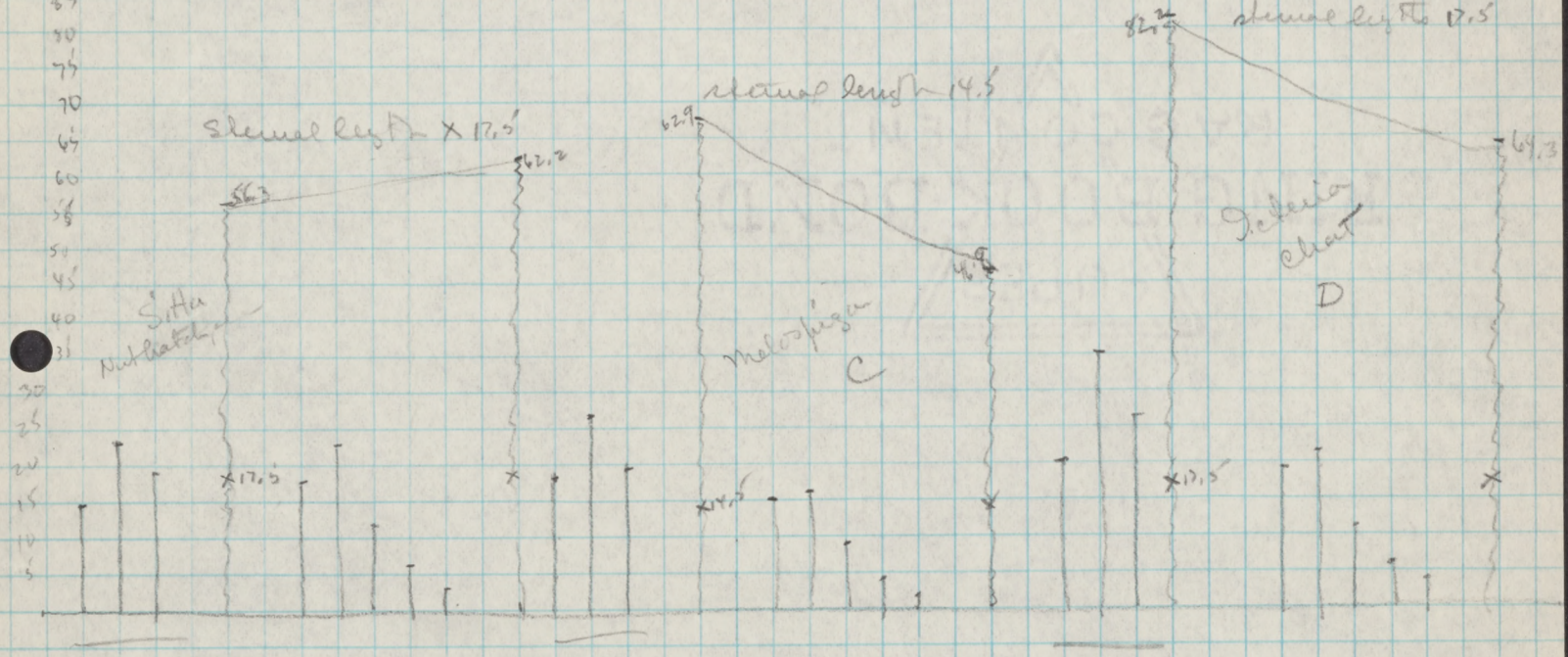
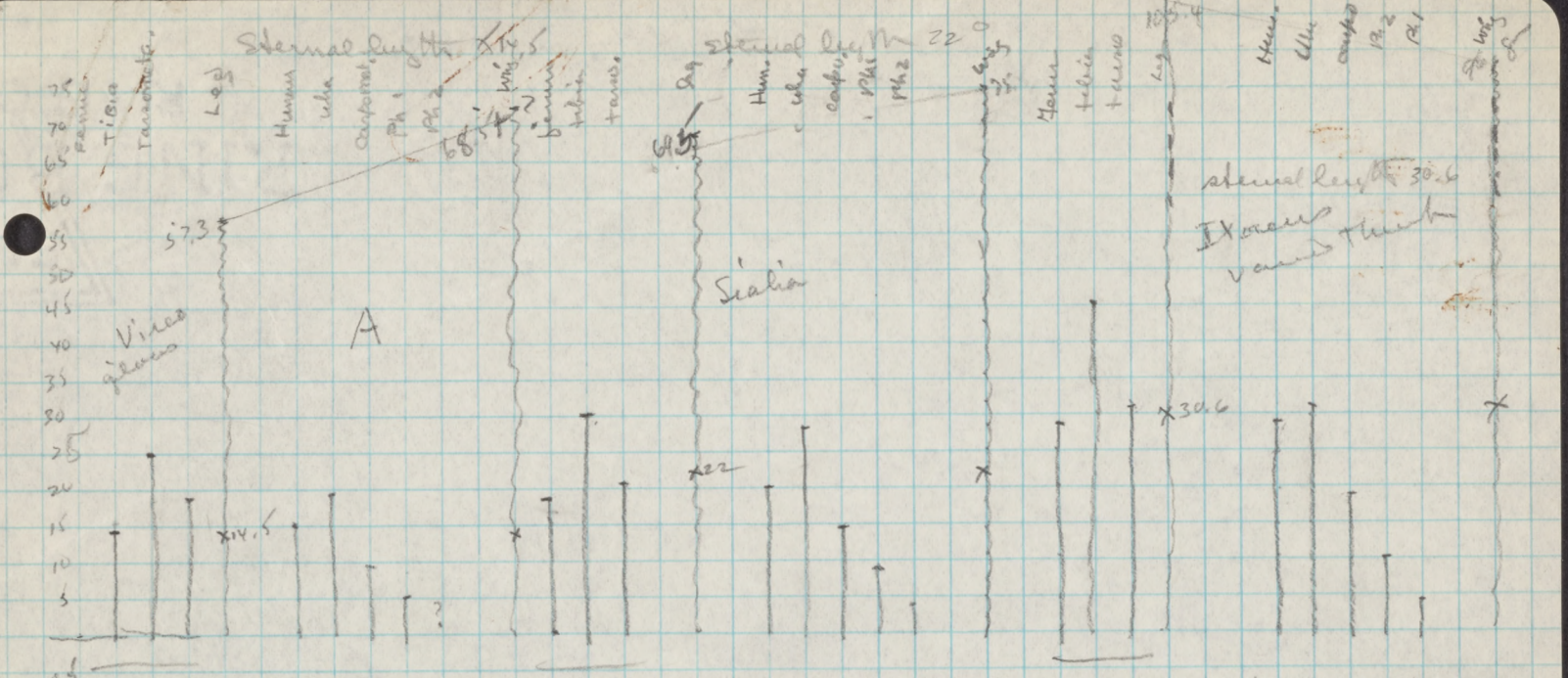
Sta. maria fossil Bird, Comparison of modern forms to —

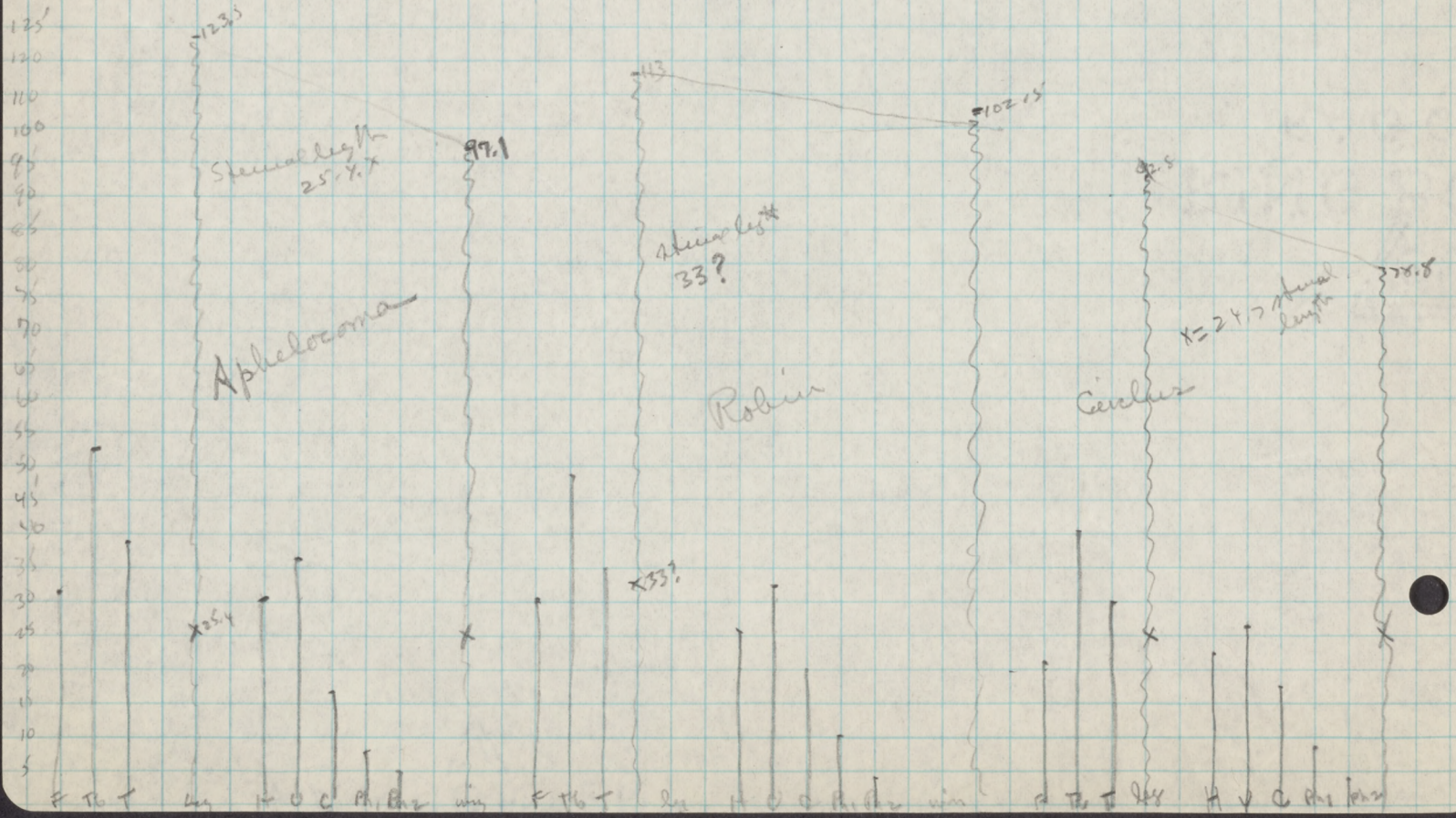
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[illegible]

	Ratio feur to tibia	Ratio tarsus to tibia	Ratio tarsus to feur	Ratio humerus to pach. tarsus	Ratio carypus to nail	Ratio leg to wing	Length osseous limb to leg to sternum		Ratio feur to tibia	Ratio tarsus to tibia	Ratio tarsus to feur								
Zonil	70%	65%	95%	81%	54	90	150	Hartlaubia	62	60	95								
Paleopiza	66	64	97	100	57	87%		P. longicauda	60	57	94								
Otocoris	64	69	+	80%	59	91		L. parvicauda	59	59	100								
Bombusilla	69	57	-	80%	62	87		L. minica	52	52	100								
S. xoreus	64	69	110	82%	(61)	109	138												
Thraupis	63	63	100+	80%	54	93		Palaeophthalis curvica		65%									
Passer	66	66	110			102													
Cinclus	52	74	142	83%	(65)	117													
Tyrannus	66	60	-	74	54	72													
Scleria	58	74	+	101	58	127													
Amelocoma				84															
Euphagus						142													
Phainopepla						79													
Dialia	59	69	115			92	157												
Sauvillonia	60	57	94	82	50														
L. parvicauda	59	59	100	81															
L. minica	52	52	100	80		94%													
Hartlaubia	62	60	95	80		97%	150-												
Sturnus																			
Stodwig		62		82%		97%													
Oreoscoptes							156												
Turdus	62	73	116				138												

tibia tarsus humerus ulna carypus
 23 15 13 14 8 92%





Stem leg wing
30:82.5:91

1:2.75:3 fossil ✓

145) 5

22:68:74

1:3:3.3 Otocoris

29:128:90

1:4.41:3 Euphagus

21:57.8:72.9

1:2.75:3.47 Phainopepla ✓

22:64.9:69.6

1:2.81:3.16 Bombycilla

28:7:67.3:92.6

1:2.34:3.5 Tyrannus

25.1:69.1:74.1

1:2.75:2.95 Thrupis ✓

30.6:105.4:96.8

1:3.44:3.16 Orocorys

22:49.2:56.0

1:3.16:3.4 Sialia

17.5:56.3:62.2

1:3.21:3.55 S. Ha

33:113:102.

1:3.42:3.1 Turdus

25.4:123.5:97.1

1:4.07:3.8 Aphelocoma

14.5:57.3:68.5?

1:3.95:4.73 Vireo

Miocene Fossil Bird -- Description of specimen

Skull: Right lobe of endocranial cast is present on the small slab surrounded by fragments of cranial bone.
Right side of cranium -- impression shows on large slab.

Impression of left side of rostrum poor on small slab
Impression of right side of rostrum very good, with external nares clearly shown, on large slab

Sclerotic ring present above rostrum (out of place). Shows in both slabs but is impression in the large, bone present in the small.

Lower Mandible: Faintly impressed ventral surface of symphysis and external edge of right ramus in small slab; very faint line indicates position of other ramus.
Both rami bone present in large slab, having been worked out by the preparator. Slightly angular contour of dorsal border visible as worked out by preparator on right side. Ventral borders of both rami are uppermost in the slab.
Impression of dorsal surface of symphysis present in large slab but in convex contour of ventral side, as though mandible laid dorsal side down had been lifted off leaving an impression of the dorsal surface. Impression of ventral surface shows on small slab.

Furcula: Small bone fragments and impression mark the full extent of the furcula on the large slab, except for the symphyseal prominence.
Right side of furcula represented by bone exposed by preparation; coracoidal end worked out by preparation -- on small slab
Left side shows as impression with small bit of bone at the coracoidal end -- on small slab
Symphysis shows as a slit into the end of the slab in the small slab. Small slab ends here and break occurs at this point.

Sternum: Shown only on large slab except for about half of manubrium represented by impression on the small one.
Impression of left side in place with respect to furcula on large slab, showing manubrium, contour of carina and curved ridge on the carina (impressed on the specimen, not raised). Also showing left costal border with impression of costal ridges and ribs attached.
Bone present at posterior tip center and xiphisternal process as worked out by preparator (left side)

Coracoids: Left coracoid shown as impression of anterior surface at the lower end and a few bone fragments at the upper end on the large slab. On the ~~large~~ small slab the upper part has some bone fragments but shows contours of projection of head toward internal side (bone having lain posterior side down); lower end shows impression of posterior surface.
Right coracoid shown only as faint impression of external side of lower end on the large slab. On the small slab the preparator has exposed the external side ~~of the upper half~~ of the middle of the shaft and glenoid and scapular facets.

Scapulae: Visible only on small slab. Left scapula only indicated, by slight bit of bone near coracoid.
Right scapula (on small slab only), head uncovered by preparator. Appears to be lying with dorso-external surface up and exposed; where the glenoid facet should be, however, the bone is broken.

Humeri: Right -- proximal end slightly above backbone, bone lies aslant across where backbone would be and beneath the right ulna. Distal end submerged, appears as a cavity which may be possible to work out by preparation, on the small slab. No evidence of this distal part on the large slab. The proximal end has its palmar impression on the small slab, its anconal impression on the large.

Left humerus -- proximal end only ~~is~~ visible on either slab, although there is a possibility that the distal end lies in the matrix on the small slab. To work it out, however, would probably result in destruction of the proximal part of the right humerus. Palmar face impressed on large slab, anconal face impressed on small slab.

Ulnae: Right -- Impression of the external side of the right ulna is shown on the large slab, its internal side is impressed on the small slab. The bone lies across the backbone area and (in the small slab) overlies the distal portion of the right humerus. A cast of the impress on the small slab reveals the contour of the ligamentary attachment on the internal side of the proximal end. large

Left ulna -- is very faintly impressed on the ~~large~~ slab, but on the ~~small~~ it is very deeply impressed (almost at full mold) with center of shaft intact as bone. A cast taken from this deep impression shows the anconal surface of the proximal end and the external surface of the external condyle of the distal end. The bone lies along the back its proximal end posteriorly and above the vertebrae, its distal end forward and slightly below the vertebrae.

Radii: Right -- impression visible on both slabs lying across the distal end of the right ulna and ~~broken~~ the impression destroyed ~~by~~ in the middle by the distal end of the ulna.

Left radius -- lies in place beside the left ulna, as a faint impression on the large slab and a good portion of the shaft in bone on the small slab, with distal end impressed.

Carpometacarpi: Right -- impression of external side on large slab, impression of internal side on small slab, with portion of bone giving external contour at distal end of M3 on the small slab.

Left -- Impression of internal side on large slab, impression of external side with some bone adhering on small slab.

Right bone lies apart from the body of the skeleton and above it. Phalanx 1 of digit 3 is in place below it on both slabs.

Left bone lies at an angle to the radius and approximately in place at its distal end. Phalanx 1 of both digits 2 and 3 show as impressions in place

Separate wing phalanx Phalanx 1 of digit 2 with ph 2 of same digit shown on both slabs as impression. Lie below body and near coracoid

Legs shown on large slab only. Lying about two inches posterior to rest of skeleton

~~Remarks on Right leg~~

Right leg: -- external impression of femur
external impression of tibiotarsus in place (a few chips of bone)
external impression of tarsometatarsus in place with the following phalanges--
Phalanx 1 of digit 1 and ungula in place
Phalanges 1, 2, 3, (but no ungual) of digit 3 in place
Phalanges 1, 2, 3, 4 and ungula of digit 4 in place
DIGIT 2 would have been uppermost and is gone.

Left leg: -- external impression of femur
anterior (?) impression of tibiotarsus with fibula approximately in place -- in place with respect to femur
internal impression of tarsometatarsus with the following phalanges:
Phalanx 1 ~~but~~^{no} ungual of digit 1 in place
Phalanges 1, 2, 3 but no ungual of digit 3 in place
Phalanges 1, 2 and ungual of digit 2
Also metatarsal 1
Tarsometatarsus is not in place with respect to the tibiotarsus and femur but lies below the right tarsometatarsus.

Pelvis: The right femur lies across the anterior end and obliterates the impression of this part. Posteriorly and part of the anterior section shows as impression of the dorsal surface. A jumbled mass at the distal end may be caudal vertebrae.

Miscellaneous bones and impressions:

Tracheal rings are scattered below the head in the small slab.
Also on the small slab are discolored areas around all the bones indicating exudation from the flesh of the bone at an early stage in preservation.
Impressions of some of the feathers of one wing, especially, two rachises with faint indication of barbules, suggest primaries and perhaps some secondaries the whole enhanced by discoloration of the area -- in the small slab -- lying below the body and seemingly related in position to the bones of the left wing (the ulna-radius and carpometacarpus of which are more or less in place with respect to each other)
Cuneiforms -- indications of the presence of both cuneiforms are present on the ~~xx~~ large slab, the right is near the right carpometacarpus (slightly back of it) -- this shows; also in the small slab; the left is just in front near the proximal end of the left carpometacarpus (also shows on small slab).
Many ribs are present as actual bone on the small slab, scattered between the body and the right carpometacarpus; and as impressions in the same place on the large slab and also attached to the costal ridges on the large (impressions)

Specimens examined for study of passerine bird from Tepusquet Creek

Suborder Tyranni

Superfamily Tyrannoidea

Family Pittidae

NO

Pitta cyanoptera

Family Tyrannidae

NO

Tyrannus verticalis Bil522

NO

Myiarchus cinerascens Bi454

Family Cotingidae

NO

Rupicola crocea Bil611

Suborder Oscines (Passeres)

Family Alaudidae

Otocoris alpestris Bil711-1715 and 1718 ♂

NO

Family Hirundinidae

Petrochelidon albifrons Bil523

Hirundo erythrogaster Bil720

*Family Paleospizidae

Paleospiza bella (photos and description)

Family Pycnonotidae Bulbuls

Microscelis madagascariensis (photos)

Microscelis amaurotis AMNH 3825

Microscelis leucocephalus USNM 289912 and 292161

Family Muscicapidae

Subfamily Muscicapinae Old world flycatchers

Alseonax lugens USNM 291351

Muscicapula unicolor USNM 343070

Bias musicus USNM 291130

Subfamily Timaliinae

(Tribe Chamaeini, wrentits)

Chamaea fasciata Bi588 and Bil403

Subfamily Sylviinae Old world warblers

Phylloscopus borealis MVZ 126833

Regulus cinerascens MVZ 52018

Acrocephalus arundinaceus MVZ 1204038

Subfamily Turdinae

Turdus migratorius Bi927

Ixoreus naevius ~~mexicanus~~ Bil316 and 1422

Sialia mexicana ~~occidentalis~~ Bil51-152 and Bi53

Hylocichla ustulata Bi787

Subfamily Miminae

Mimus polyglottos

Oreoscoptes montanus Bi952 and Bil595

Toxostoma redivivum Bi278

Subfamily Troglodytinae

✓ *Salpinctes obsoletus* Bil542 *Thryomanes bewickii* Bil725

Subfamily Cinclinae

Cinclus mexicanus MVZ 83630 ♂

Family Motacillidae Wagtails and pipits

Motacilla flavius MVZ 126840

Anthus spinoletta MVZ 50495

Family Laniidae

NO *Lanius ludovicianus* Bi77-78 and others Bi

X Family Bombycillidae

Subfamily Ptilogonatinae Silky flycatchers

Phainopepla nitens MVZ 50491 ♀

Subfamily Bombycillinae waxwings

Bombycilla cedrorum Bi764 and Bi1612

Family Certhiidae Creepers

Certhia familiaris ^{occidentalis} MVZ 73108 ♂

Family Sittidae Nuthatches

Sitta carolinensis ^{aculeata} MVZ 74743 ♂ Sitta canadensis MVZ 72847

Family Paridae Titmice

Parus inornatus

Family Vireonidae

Vireo solitarius ^{cassini} MVZ 68356 ♂

Vireo gilvus MVZ 87629

X ✓ Family Thraupidae Tanggers

Subfamily Parulinae (Compsothlypidae) wood warblers

Icteria virens ^{longicauda} MVZ 88531 sex? Compsothlypis graysoni Bi 942

Wilsonia pusilla Bi188 Dendroica audubonii Bi928

Subfamily Thraupinae Tanagers

Piranga ludoviciana MVZ 58445 ♀ and Bi1246

Thraupis episcopus ^{cana} MVZ 94130 ♂

Chlorospingus ophthalmicus MVZ 121482

NO Family Fringillidae

Subfamily Emberizinae

Melospiza melodia

Pipilo fuscus

Subfamily Fringillinae (Linnets)

NO Family Icteridae

Sturnella neglecta Bi1527

Euphagus cyanocephalus Bi776 and Bi75 and Bi87

Agelaius phoeniceus Bi649 and Bi1248

Family Ploceidae Weaver birds

Passer domesticus Bi953-954 and 1411

X Family Sturnidae starlings

Sturnus vulgaris USNM 344805 and 427868

Sturnis malabarica USNM 343077

Spodiopsar sericeus USNM 319397

Creatophora carunculata USNM 347092

Agropsar sturninus USNM 344669

X Family Corvidae

Aphelocoma ^{californica} Bi168, 214 and 285-286

Pica nuttallii Pica pica Bi630 and Bi 1051

Cyanocitta stelleri Bi815-~~28~~ 816 and Bi654

Family Paridae Bi 312 - 313

BEECHER'S TAXONOMY

Superfamily SYLVIOIDEA

Family Sylviidae

- Subfamily Sylviinae warblers
- ✓ - Subfamily Pycnonotinae bulbuls
- Subfamily Muscicapinae flycatchers, ~~throatbreasted warblers~~
- Subfamily Cisticolinae -- grass warblers

Family Sturnidae

Family Hirundinidae

Family Turdidae

Subfamily Saxicolinae -- chats

Subfamily Turdinae -- thrushes

- Subfamily Miminae -- mimic thrushes

- Subfamily Cinclinae -- dippers

✓ Family Corvidae

Family Ptilonorhynchidae

Family Callaeidae

Family Paradisaeidae

Family Oriolidae

Family Campephagidae

✓ Family Bombycillidae (including Phainopeplas)

Family Zosteropidae

Family Nectariniidae

Family Dicaeidae

Superfamily Timalioidae

Family Timaliidae

Subfamily Cisticolinae

Family Monarchidae

subfamily Monarchinae

Diururinae

Pachycephalinae

Vireoninae

Family Cracticidae -- shrikes et al

Subfamily Artaminae

Cracticinae Pityriasisinae

Grallinae

Family Vangidae helmet shrikes

Vanginae

Prionopinae

Family Laniidae true shrikes

Malaconotinae

Laniinae

Family Meliphagidae

Melophaginae and Promeropinae and Aegithininae

Family Estrildidae

Family Ploceidae

Family Parulidae

Parulinae, Coerebini, Emberizinae

Family Geospizidae

Family Icteridae

Family Thraupidae

Drepanidae

Family Motacillidae

Alaudidae

Troglodytidae

Certhiidae

→ Sittidae

→ Paridae

→ Paradoxornithidae (warblers)

Mayr and Amadon

Wetmore

Beecher

Suborder Tyranni
 Tyrannidae ✓
 Cotingidae ✓

Suborder Oscines
 Alaudidae ✓
 Hirundinidae ✓

Muscicapidae ✓

Muscicapini

Sylviidae

Turdinae

Mimidae

Cinclinae

Motacillidae ✓

Laniidae ✓

Bombycillidae ✓

Ptilogonatidae

Bombycillinae

Certhiidae ✓

Sittidae ✓

Paridae ✓

Vireonidae ✓

Thraupidae ✓

Fringillidae ✓

Icteridae ✓

Floceidae ✓

Passerinae ✓

Sturnidae ✓

Corvidae ✓

Suborder Tyranni

Tyrannidae ✓

Cotingidae ✓

Suborder Passeres

Alaudidae ✓

Hirundinidae ✓

Muscicapidae ✓

~~Chondestidae~~ ✓

Sylviidae ✓

Turdidae ✓

Mimidae ✓

Cinclidae ✓

Motacillidae ✓

~~Chondestidae~~ ✓

Laniidae ✓

Bombycillidae ✓

Ptilogonatidae ✓

Certhiidae ✓

Sittidae ✓

Paridae ✓

Vireonidae ✓

Thraupidae ✓

Fringillidae ✓

Icteridae ✓

Floceidae ✓

Sturnidae ✓

Corvidae ✓

Campylorhynchidae ✓

Suborder Oscines

Superfamily Sylvioidea

~~Hirundinidae~~

Sylviidae

1 Assemblage related

Turdidae

Hirundinidae

Sturnidae

Suborder Sylvioidea

Family Sylviidae

Assemblage 1

Turdidae

Hirundinidae

Sturnidae

Assemblage 2

Suborder Sylvioidea

Sylviidae

Related to Muscipap

of Sylviidae

Turdidae

Hirundinidae

Sturnidae

Related to Pycnont

of Sylviidae

Corvidae

Ptilonorhynchidae

Callaeidae

Paradisaeidae

Oriolidae

Campephagidae

Bombicillidae

Zosteropidae

Nectariniidae

Bicaeidae

Mayr and Amadon
Superfamily Tyrannoidea
Cotingidae
Tyrannidae

Published name Palaeococcyus

Skeletons of forty-eight species of living birds have been examined in comparison with Mimiturdus. These represent 24 families according to Wetmore's arrangement, 18 according to Beecher, or 16 according to Mayr and Amadon. Of all these families, that of the Muscicapidae, as defined by Mayr and Amadon ~~is proper~~ or the Turdidae as defined by Beecher, is probably the most appropriate category in which to place the fossil bird. In the Muscicapidae, Mayr and Amadon (p.) include subfamilies and tribes representing not only the Old World Flycatchers, but many other groups previously given family status, of which the thrushes, thrashers, and dippers are the most significant in relationship to the fossil bird. Beecher (p.) relates the Turdidae to the Muscicapidae, without placing them in the same family; he also includes the thrashers and dippers with the thrushes.

In characters of the beak, ~~and~~ shape of the manubrium of the sternum, and proportions of the wing bones

Mimiturdus is thrush-like; on the other hand the moderate height of the sternal carina and the short notches with broad lateral processes of the sternum are quite different than in the thrushes but resemble the dippers and to a lesser extent certain of the thrashers. ~~Thrashers, dippers and~~ It is in the shortness of the leg that Mimiturdus differs most markedly from the thrashers, thrushes and dippers. Overall leg length relative to wing length is approximated in Sialia ~~and~~ (ratio of leg to wing 90 per cent in Mimiturdus, 92 per cent in Sialia), ~~but in the fossil, however, the~~ tarsometatarsus is shorter than ^{either} the ^{of the humerus} femur, ^{among the species studied} a characteristic which is found in ~~the~~ Bias musicus (Muscicapidae), Hartlaubius madagascariensis (Sturnidae), Bombycilla cedrorum (Bombycillidae), and Tyrannus verticalis (Tyrannidae).

and the ratio of length of femur to length of humerus is similar as well in Cinclus. ^(Mimiturdus 90%, Sialia 87%, Cinclus 91%) ~~The~~ In the fossil, however, the tarsometatarsus is shorter than ^{the tarsometatarsus also is relatively short} either the femur or the humerus, a characteristic which, ~~is~~ among the species studied is found in Bias musicus (Muscicapidae), Tyrannus verticalis (Tyrannidae), Bombycilla cedrorum (Bombycillidae), ^{it is also approximated in} and Hartlaubius

Relationships to Existing Families of Cassiniformes

Under the arrangement of families as recognized by the American Ornithologists Union, the fossil bird cannot be assigned to any living ~~group~~ family. If we accept, instead, the suggestions of Mayr and Amadon (1951) ^{Revised} it becomes possible? According to these authors, the thrushes, thrashers, dippers and others are grouped as subfamilies or tribes ~~under~~ within a single family, the Muscicapidae. Within this large group,

considerable variation in skeletal characters exists, including many characters which distinguish the fossil. Added to these, however, are certain other characteristics of the fossil which are distinct or suggest similarity with still other groups.

With regard to the Muscicapidae, ^{Mimi}Paleoturdus can be analyzed as follows:

Shape and size of bill and notch in symphysis of lower mandible ~~seem~~ similar to the Turdini. Slender ~~anubrium~~ of sternum as in Turdina and Miminae; height of carina and shape of its anterior border closer to Miminae; short notch and broad lateral process of sternum closely approached in Cinclus, subfamily Cinclinae. Ratio of length of leg to length of wing approached in Sialia but no other member of the ~~and~~ Turdini. ~~However~~ Distinct from ~~all the~~ Muscicapidae ^{all available} compared in relatively short tarsometatarsus and long femur. In these ~~character~~ proportions the fossil is closest to Bombycilla ~~among the~~ ~~existing forms~~ although the proportions of the individual leg bones ~~are~~ shows the bones to be more slender than in Bombycilla. A second character of the fossil which is not paralleled in the available Muscicapidae is the absence of the undercut beneath the head of the humerus; in this character, ~~resemblance~~ resemblance is closest to Aphelocoma and Otocoris.

Revised
In spite of these characters which serve to set the fossil apart from members of the family Muscicapidae, it seems advisable to refer the fossil to this group ~~rather than to place~~ under a separate subfamily, to be designated as the ~~and placed between the~~

Revised
Paleoturdini. If, as seems possible the ~~Turdiniform and the Miminae~~ absence of the undercut humeral head and the odd proportions of the leg bones may indicate less advanced specialization, the subfamily might logically appear near the top of the

Whether the characters which distinguish the group from others of the family can be considered to reflect a primitive condition, it is difficult to say, when the living forms most nearly resembling the fossil are ~~next~~ today widely separated taxonomically.

No diagnostic contours of the individual bones are evident in the impressions. Proportions, however, indicate that the fossil bird ~~had~~ not only had short legs, but with respect to the ~~leg~~ leg elements themselves, the tarsometatarsus was unusually short. The tibiotarsus is about the same length as in Icteria, but slightly heavier; ~~for~~ the femur is longer and heavier, the tarsometatarsus shorter and heavier.

From the size and proportions, the following characteristics can be noted: leg short in relation to wing; ~~femur relatively long, tarsometatarsus relatively short~~ Compared with Icteria in which the tibiotarsus is about equal in length to that of the fossil, the fossil tibiotarsus is slightly heavier, the femur longer and heavier, the tarsometatarsus shorter and slightly heavier. ^{The length of the fossil} Femur is approximately ~~70~~ ⁶⁹ % ^{length of the} length of the tibiotarsus ~~in length~~; ^{length of the} the tarsometatarsus only ~~62~~ %; in Icteria the femur is 57 per cent of the length of the tibiotarsus and the length of the tarsometatarsus 74 per cent. In Ixoreus femur is 64 per cent of tibiotarsus, tarsometatarsus 69 per cent. ^{and tarsometatarsus are approximately equal} In the tanager, Thraupis: femur ~~63~~ % ~~of the~~ length and 63 per cent of that of the tibiotarsus. Bombycilla: femur 70 per cent, tarsometatarsus 57 per cent. Paleospiza femur 66 %, tarsus, ~~65~~ ⁶⁵ %; Passer domesticus, femur and tarsus approx. equal and 66 % of tibiotarsus Cinclus femur 52 %, tarsus 74 %; Otocoris, femur 62 %, tarsus 69 %

Relationships to Laurillardia

DISCUSSION

Relationships to Other Fossil Forms

Fossil passerines are rare in the Tertiary record of North America, and none have been previously recorded in California. described as *Paleospiza* Upper Miocene. One specimen, ^{Bella} found in the Florissant lake beds of Colorado, is

preserved in much the same manner as ~~the~~ *Mimiturdus brachytarsus*.

A careful

~~and~~ comparison has been made with the description and illustrations of *Paleospiza*.

offered by Wetmore (1925, pp. 185-191, and plates 1-4). ^{The comparison} From this

~~comparison, it is apparent that the~~ *Paleospiza* and *Mimiturdus* ~~are~~ ^{shows that *Mimiturdus* is clearly distinct from *Paleospiza*.}

~~not only~~ is distinct from the genus *Paleospiza*, but that the ~~distinctions~~

are of sufficient significance to indicate family distinction.

Characters of the two birds are contrasted in the accompanying table.

These characters ~~xxxxxxx~~ as portrayed in *Paleospiza*, ^{were} are those selected by Wetmore as of sufficient significance to establish the family *Paleospizidae*. It is evident, therefore, that *Mimiturdus* cannot be referred to that family.

Paleospiza bella

Paleospiza turdina as published
Mimiturdus brachytarsus

Bones of wing strong and heavy

Bones of wing long and slender

Humerus slightly longer than ulna

Humerus shorter than ulna

Pectoral crest of humerus not extending distally below bicipital crest

Pectoral crest of humerus extending distally below level of bicipital crest

Phalanx 2 of alar digit 2 nearly half the length of the carpometacarpus

Phalanx 2 of alar digit 2 less than one-third the length of carpometacarpus

Hind toe shortest; digits 2 and 4 about equal in length.

Hind toe and digit 4 about equal in length; digit 2 shortest.

Palaeostruthus hatcheri, from the Miocene of Kansas is known only from an upper mandible which is strongly fringillid in contour, and is thus distinct from *Mimiturdus*.

Among European fossil passerines, three species of the genus

Among European fossil passerines, four Tertiary species merit careful consideration. These are *Palaegithalus cuvieri* Gervais, *Laurillardia long^{no}istris* Milne Edwards, *L. parisiensis* Flot and *L. munieri* Flot, all from the Upper Eocene of France. Although the specimens themselves are not available, the full descriptions of Milne Edwards (1871) and Flot (1891) have made possible fairly satisfactory comparisons with the California fossil. All four species are based upon skeletal imprints and thus resemble *Mimiturdus* in manner of preservation.

Palaegithalus cuvieri was a small bird assigned to the Paridae. The tarsometatarsus is longer than the femur or the humerus, and is also longer in proportion to the tibiotarsus and thus relatively long for the small size of the bird. As short tarsometatarsus is one of the outstanding characters of *Mimiturdys*, this character alone is sufficient to distinguish the two birds.

Characteristics of *Laurillardia* compared with *Mimiturdys*: ratio of humerus to forearm 80-82% (*Mimiturdus* 81%); length of upper mandible approximately half the total length of the skull, *L. longi*. 48%, *L. paris*. 51%, *L. munieri* 50%, *Mimiturday* 52%; tarsometatarsus short relative to length of tibiotarsus(*L. long*. 57%, *L. paris*. 59%, *L. munieri* 52%, *Mimiturdys* 62%) and not exceeding femur in length (*L. long*. 94% of femur, *L. paris*. and *L. munieri* equal to length of femur, *Mimiturday* 90% of femur).